



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/330,417	06/11/1999	EDWARD K. PAVELCHEK	50369	9393

21874 7590 06/04/2003

EDWARDS & ANGELL, LLP  
P.O. BOX 9169  
BOSTON, MA 02209

EXAMINER
----------

KORNAKOV, MICHAIL

ART UNIT	PAPER NUMBER
----------	--------------

1746

DATE MAILED: 06/04/2003

27

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/330,417

Applicant(s)

PAVELCHEK, EDWARD K.

Examiner

Michael Komakov

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 34-79 is/are pending in the application.  
39, 40, 44, 45, 51, 52, 66, 67, 71, 72, 78, 79
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 34-38, 41-43, 46-50, 53-65, 68-70 and 73-77 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) 34-79 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 25
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### DETAILED ACTION

1. The cancellation of claims 1, 4-12, 14-17, 20, 24-33 and introduction of new claims 34-80 in Applicant's amendment, dated 03/18/2003, Paper No. 24, are noticed.
2. Claims 34-79 are pending in the application (see ***Claim Objections*** below)

### ***Election/Restrictions***

3. This application contains claims directed to the following patentably distinct species of the claimed invention:

- the specie of radiation absorbing chromophore, as recited in the instant claims 38, 39, 40, 43, 44, 45, 64, 66, 67, 71, 72, 73;
- the specie radiation wavelength, as recited in the instant claims 50, 51, 52, 77, 78, 79.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 34, 37, 41, 62, 63, 68, 69 are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include

Art Unit: 1746

all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

4. During a telephone conversation with Mr. P. Corless, esq., on 05/30/2003 a provisional election of anthracene as radiation absorbing chromophore, which recited by the instant claims 38, 43, 65, 70 and a provisional election of radiation wavelength of 248 nm, which is recited by the instant claims 50 and 78 was made. Affirmation of this election must be made by applicant in replying to this Office action. Claims 39, 40, 44, 45, 51, 52, 66, 67, 71, 72, 78 and 79 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### ***Claim Objections***

5. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. **When new claims are presented, they must be numbered consecutively beginning with the number**

Art Unit: 1746

**next following the highest numbered claims previously presented (whether entered or not).**

Misnumbered claims 57-80 have been renumbered as claims 56-79.

***Claim Rejections - 35 USC § 102***

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

6. Claims 34, 35, 37, 38, 41, 43, 46-50, 53-57, 59-62, 64, 65, 68, 70, 73-77 are rejected under 35 U.S.C. 102(e) as being anticipated by Sato et al (U.S. 6,270,948).

Sato teaches a method of forming a pattern, which comprises the steps of forming a work film on a wafer substrate, forming an organosilicon resin film over the work film, applying a layer of photoresist over the organosilicon resin film, exposing photoresist to light source and developing photoresist, thus forming photoresist pattern (reads on "relief image", as instantly claimed) (See Abstract; col.2, lines 14-22; col.4, lines 49-67; formulas 1-1 to 1-114; Fig. 1D). Sato specifically indicates that organosilicon film inhibits reflection of light from the underlying substrate (reads on "antireflective organic layer", as instantly claimed) (col.4, lines 20-22). Regarding the nature of work film, Sato teaches that there is no any particular limitation on the kind of this work film. Namely, it may be an insulating film of silicon oxide (reads on "inorganic dielectric layer", as instantly claimed or blank material, usually employed for manufacturing photomask (reads on "dielectric layer comprises organic resin", as

Art Unit: 1746

instantly claimed) (col. 4, lines 2-11; col.86, lines 18-23), which corresponds to the limitations of the instant claims 53-55. The formation of organosilicon film of Sato includes spin-coating, heating and crosslinkng prior to applying photoresist composition (col.89, lines 38-45; paragraph, bridging col. 106 and 107), which corresponds to the limitations of the instant claims 46, 60, 61 and 73.

The organosilicon silicon film of Sato comprises anthracene groups (col. 6, 10, 12). In specific regard to claims 41, 47, 48, 49, 56, 57, 64, 65, 68, 70, 74, 75, 76 Sato teaches that an ultraviolet absorbing dye for preventing the light reflected by the work or a crosslinking agent comprising anthracene groups or conductive material comprising carboxylic aril groups can be added to organosilicon compound (col.27, lines 52-62; paragraph, bridging col.27 and 28; col.39, 2-94; col.42, 3-9; col.58, lines 40-42). With regard to claims 50 and 77 Sato teaches exposing photoresist to the light produced by KrF excimer, which by the virtue of its nature produces the radiation with wavelength of about 248 nm. With regard to claims 59 Sato provides the acid generator, which is recited in col. 49, lines 60-65.

Therefore, all the limitations of instant claims are met by Sato.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 62-64 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 0 501 178.

EP'178 teaches forming a photoresist image over substrate by applying to substrate antireflective coating, which includes methyl phenyl silsesquioxane resin, then

Art Unit: 1746

applying a deep UV resist layer over the silicon containing resin, exposing photoresist layer to deep UV radiation and developing said resist layer, thus producing a photoresist image and exposing portions of silicon containing resin (Fig. 1A, 1B; col. 4, lines 44-46, 17-23; col.5, lines 5-10).

Therefore, all the limitations of instant claims are met by EP'178.

### ***Claim Rejections - 35 USC § 103***

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1746

10. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Ding et al (U.S. 5,981,145).

Sato discloses the use of conventional amines as crosslinkers, however remains silent about the use of specific specie of such amines, like glycouril.

However, glucouril is conventionally known and widely utilized as commercial crosslinking agent in the production of antireflective coatings (ARC). This is confirmed by Ding in col.7, lines 40-56 and especially in line 48. A person skilled in the art motivated by suggestion of Sato to utilize conventional amine as crosslinkers and by similarity of the applications of crosslinkers in ARC production, would have found it obvious to employ glucouril of Ding in order to expand the number of conventional crosslinkers while forming the ARC of Sato with the reasonable expectation of success.

11. Claims 36, 42 and 69 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Clodgo et al (U.S. 4,981,530).

While providing for method of forming a pattern using organosilicon antireflective coating and utilizing the steps, similar to those instantly claimed, Sato remains silent about antireflective composition, which comprises silsesquioxane resin. However, Sato motivates the skilled artisan to add different ingredients to his silicon containing antireflective coating composition in order to facilitate the use of his composition and improve its properties, for example adhesion (col.27, lines 52-63).

Silsesquioxane resins is conventionally utilized in semiconductor processing for



Art Unit: 1746

obtaining thermally stable and crack resistant films with improved adhesion properties, which is recited in Clodgo, col. 2, lines 15-18; col.5, lines 1-9. Therefore, the skilled artisan, motivated by disclosure of Sato and teaching of US'530, would have found it obvious to introduce the silsesquioxane of Clodgo into the organosilicon antireflective coating in order to improve its adhesion while forming the semiconductor structure of Sato and thus to arrive at the limitations as instantly claimed.

### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 1746

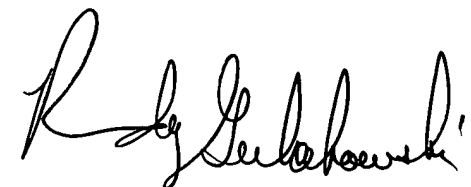
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (703) 305-0400. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (703) 308-4333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872 9310 for regular communications and (703) 872 9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 2450.

Michael Kornakov  
Examiner  
Art Unit 1746

MK  
May 31, 2003

A handwritten signature in black ink, appearing to read 'Randy Gulakowski', is written in a cursive style.

RANDY GULAKOWSKI  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700